Code: 1659 **Functional Biology**
Degree: 1st cycle – Agriculture
Curricular Year: 2nd **Semester Course: 1st**
Credits: 6 ECTS **Compulsory**
Language: Portuguese/English
Prerequisites: Cell Biology and Microbiology
Responsible: João Manuel Neves Martins
Other lecturer(s): Ricardo Manuel Seixas Boavida Ferreira, Maria da Glória Calado Inglês Esquível, Sara Barros Queiroz Amâncio and João Manuel Dias dos Santos Pereira
Web Site: http://www.isa.utl.pt/home/node/3987

1. Contact hours:
Lectures 28 **Praticals/Laboratory** 42 **Others** 14 **Total** 84

2. Objectives:

In this area of scientific knowledge is aimed to learn and train both genetic and physiological analysis skills to access normal processes of solving problems in important biology areas either animal or plants.

3. Programme:

***MODULE 1: GENETICS* (15 de Setembro a 31 de Outubro)**

Theory:

Innovation processes in genes/genomics: Mutations, point mutations, chromosome mutations (changes in number and structure). Recombination mechanisms, *in situ*-specific and transposition; Genetic analysis: chromosome behaviour; Gene transmition patterns; Chromosome mapping by gene recombination. Genetic engineering: Recombinant molecules; Isolation and gene handling; Genomics. Genome organization.

Praticals:

Mendelian genetic analysis. Extentions of Mendelian analysis: multiple alleles, lethal alleles, gene interations, genes pleiotropics genes. Sex-linked patterns of inheritance. Linkage. Maps. Tests.Polygenic Inheritance.

***MODULE 2: PLANT PHYSIOLOGY* (3 November to 19 December)**

Theory:

Interactions between plants and the environment. Carbon, nitrogen and sulfur metabolisms. Photosynthesis (phtochemical reactions and carbon assimilation reactions) and plant respiration. Metabolic and environmental limitations to plant productivity. Phloemic translocation of photoassimilates. Source and sink concepts. Accumulation of reserves in storage organs. Absorption and transport of water within the plant – Water relations and plant water balance. Signals, receptors and transduction pathways of development associated signalling. Classic and emerging hormones.

Practicals:

The Hill reaction. Chromatographic fractionation of photosynthetic pigments. Measurement of photosynthetic rate. Problems on photosynthesis. Nitrate reductase. Measurement of plant tissue water content. Calculations on water relations.

4. Bibliography:

Main Bibliography

MODULE 1: GENETICS

- A.J.F.Griffiths, S.R.Wessler, R.C.Lewontin e S.B.Carroll (2009) - Introdução à Genética (9ªEd.) Guanabara Koogan [ISBN: 13: 978-85-277-1497-6]

MODULE 2: PLANT PHYSIOLOGY

- Azcón-Bieto, J. e Talón, M. (eds.) (2000) Fundamentos de Fisiologia Vegetal. McGraw-Hill Interamericana.
- Taiz, L. e Zeiger, E. (2006) Plant Physiology. Sinauer Associates, Inc., Publishers. 4th ed. (ou 2002 3rd ed).
- Scientific articles and book chapters supplied by the lecturers.

Other Bibliography

MODULE 1: GENETICS

- W.S.Klug, M.R.Cummings, C.Spencer, M.A.Palladino (2009) - Concepts of Genetics (9th Ed.). Pearson Ed. Inc. [ISBN: 9780321524041]
- Extracts from "***Trends in Genetics***" and other reviews.
- Lectures Slides (power-points). Collection of problems.

MODULE 2: PLANT PHYSIOLOGY

- Slides (power-point) supplied by the lecturers

5. Assessment:

1. Frequency
Minimum classification of 8.0 points (out of 20) in sections (i) and (ii).
For classifications equal or higher than 9.5, the students are dispensed of the final exam.
(i) - (30%) Mini-tests on practical classes or lectures
Average minimum classification of 8 (out of 20).
(ii) - (50%) Global theoretical-practical tests
Minimum classification of 8.0
1st Module: 27 October (wednesday) 16 h (all classes)

2nd Module: 19 December (friday)
(iii) - (20%) Research report
1st Module: based on articles published in Current Opinion in Genetics and Development or Trends in Genetics.
2nd Module: based on review articles published in Trends in Plant Science or Annual Review of Plant Physiology and Biochemistry.
At least half of the reported must be directly related to basic matters presented in the lectures
2. Final exame
Attending the final exam is compulsory for all students with classifications lower than 9.5 in one of the modules

6. Estimated Workload:	168	Hours
7. Last Update:	25/2/2011	